What is claimed is:

1. A nitride semiconductor device having a nitride semiconductor layer structure comprising:

an active layer of a quantum well structure which has a first surface and a second surface and which comprises an indium-containing nitride semiconductor;

a first nitride semiconductor layer which is formed to adjoin the first surface of the active layer and has a band gap energy larger than that of the active layer;

a second nitride semiconductor layer which is formed on the first surface side of the active layer at a location more distant from the active layer relative to the first nitride semiconductor layer and which has a band gap energy smaller than that of the first nitride semiconductor layer; and

a third nitride semiconductor layer which is formed on the first surface side of the active layer at a location more distant from the active layer relative to the second nitride semiconductor layer and which has a band gap energy larger than that of the second nitride semiconductor layer.

2. The device according to claim 1, wherein said first nitride semiconductor layer has a thickness sufficiently thin such that carriers may tunnel therethrough.

3. The device according to claim 1, wherein said

first nitride semiconductor layer has a thickness of 0.1 μm or less.

4. The device according to claim 3, wherein said first nitride semiconductor layer has a thickness of 10 angstroms or more.

5. The device according to claim 1, wherein said active layer is doped with an impurity.

6. The device according to claim 5, wherein said impurity comprises silicon or germanium.

7. The device according to claim 5, wherein said impurity is doped in said at least one well layer.

8. The device according to claim 1, wherein said layer structure is provided on a p-side of the active layer.

9. The device according to claim 8, wherein said second nitride semiconductor layer adjoin said first nitride semiconductor layer.

10. The device according to claim 9, wherein said third nitride semiconductor layer adjoins said second nitride semiconductor layer.

11. The device according to claim 1, wherein said layer structure is provided on an n-side of the active layer.

12. The device according to claim 11, wherein said second nitride semiconductor layer adjoins said first nitride semiconductor layer.

13. The device according to claim 12, wherein said

third nitride semiconductor layer adjoins said second nitride semiconductor layer.

14. A nitride semiconductor device comprising:

an active layer of a quantum well structure which has a first surface and a second surface and which comprises an indium-containing nitride semiconductor;

a first layer which adjoins the first surface of the active layer and has a band gap energy larger than that of the active layer;

a second layer which is formed on the first surface side of the active layer at a location more distant from the active layer relative to the first layer and which comprises a nitride semiconductor containing an acceptor impurity and which has a band gap energy smaller than that of the first layer; and

a third layer which is formed on the first surface side of the active layer at a location more distant from the active layer relative to the second layer and which comprises a nitride semiconductor containing an acceptor impurity and which has a band gap energy larger than that of the second layer.

15. The device according to claim 14, wherein said first layer has a thickness sufficiently thin such that carriers may tunnel therethrough.

16. The device according to claim 14, wherein said first layer has a thickness of 0.1 μm or less.

17. The device according to claim 16, wherein said

first layer has a thickness of 10 angstroms or more.

18. The device according to claim 14, wherein said active layer is doped with an impurity.

19. The device according to claim 18, wherein said impurity comprises silicon or germanium.

20. The device according to claim 18, wherein said impurity is doped in said at least one well layer.

21. The device according to claim 14, wherein said second layer adjoins said first layer.

22. The device according to claim 21, wherein said third layer adjoins said second layer.

23. A nitride semiconductor device comprising:

an active layer of a quantum well structure which has a first surface and a second surface and which comprises an indium-containing nitride semiconductor,

a first layer which is formed to adjoin the second surface of the active layer and which comprises a nitride semiconductor and which has a band gap energy larger than that of the active layer;

a second layer which is formed on the second surface side of the active layer at a location more distant from the active layer relative to the first layer, which comprises an n-type nitride semiconductor, and which has a band gap energy smaller than that of the first layer,

a third layer which is formed on the second surface side of the active layer at a location more

distant from the active layer relative to the second layer, which comprises an n-type nitride semiconductor, and which has a band gap energy larger than that of the second layer.

24. The device according to claim 23, wherein said first layer has a thickness sufficiently thin such that carriers may tunnel therethrough.

25. The device according to claim 23, wherein said first layer has a thickness of 0.1 μm or less.

26. The device according to claim 25, wherein said first layer has a thickness of 10 angstroms or more.

27. The device according to claim 23, wherein said active layer is doped with an impurity.

28. The device according to claim 27, wherein said impurity comprises silicon or germanium.

29. The device according to claim 27, wherein said impurity is doped in said at least one well layer.

30. The device according to claim 23, wherein said second layer adjoins said first layer.

31. The device according to claim 30, wherein said third layer adjoins said second layer.

32. A nitride semiconductor device comprising:

an active layer of a quantum well structure which has a first surface and a second surface and which comprises an indium-containing nitride semiconductor;

a first nitride semiconductor layer structure comprising a first p-side nitride semiconductor layer

which is formed to adjoin the first surface of the active layer and has a band gap energy larger than that of the active layer, a second p-side nitride semiconductor layer which is formed on the first surface side of the active layer at a location more distant from the active layer relative to the first p-side nitride semiconductor layer and which has a band gap energy smaller than that of the first p-side nitride semiconductor layer, and a third p-side nitride semiconductor layer which is formed on the first surface side of the active layer at a location more distant from the active layer relative to the second p-side nitride semiconductor layer and which has a band gap energy larger than that of the second p-side nitride semiconductor layer; and

a second nitride semiconductor layer structure comprising a first n-side nitride semiconductor layer which is formed to adjoin the second surface of the active layer and has a band gap energy larger than that of the active layer, a second n-side nitride semiconductor layer which is formed on the second surface side of the active layer at a location more distant from the active layer relative to the first n-side nitride semiconductor layer and which has a band gap energy smaller than that of the first n-side nitride semiconductor layer, and a third n-side nitride semiconductor layer which is formed on the second

surface side of the active layer at a location more distant from the active layer relative to the second n-side nitride semiconductor layer and which has a band gap energy larger than that of the second n-side nitride semiconductor layer.

33. The device according to claim 32, wherein said first p-side nitride semiconductor layer has a thickness sufficiently thin such that carriers may tunnel therethrough.

34. The device according to claim 32, wherein said first p-side nitride semiconductor layer has a thickness of 0.1 μm or less.

35. The device according to claim 25, wherein said first p-side nitride semiconductor layer has a thickness of 10 angstroms or more.

36. The device according to claim 32, wherein said active layer is doped with an impurity.

37. The device according to claim 36, wherein said impurity comprises silicon or germanium.

38. The device according to claim 36, wherein said impurity is doped in said at least one well layer.

39. The device according to claim 32, wherein said first n-side nitride semiconductor layer has a thickness sufficiently thin such that carriers may tunnel therethrough.

40. The device according to claim 32, wherein said first n-side nitride semiconductor layer has

a thickness of 0.1 μm or less.

41. The device according to claim 40, wherein said first n-side nitride semiconductor layer has a thickness of 10 angstroms or more.

42. The device according to claim 32, wherein said second p-side nitride semiconductor layer adjoins said first p-side nitride semiconductor layer, and said third p-side nitride semiconductor layer adjoins said second p-side nitride semiconductor layer.

43. The device according to claim 42, wherein said second n-side nitride semiconductor layer adjoins said first n-side nitride semiconductor layer, and said third n-side nitride semiconductor layer adjoins said second n-side nitride semiconductor layer.

44. A nitride semiconductor device having, on a substrate, a layer structure comprising an n-type contact layer, a first n-type clad layer which comprises an aluminum-containing nitride semiconductor, a second n-type clad layer which comprises an indium-containing nitride semiconductor or GaN, an active layer of a quantum well structure which comprises an indium-containing nitride semiconductor, a first p-type clad layer which comprises an aluminum-containing nitride semiconductor, a second p-type clad layer which comprises an indium-containing nitride or GaN, a third p-type clad layer which comprises an aluminum-containing nitride semiconductor, and

a p-type contact layer.

45. The device according to claim 44, wherein said active layer is doped with an impurity.

46. The device according to claim 45, wherein said impurity comprises silicon or germanium.

47. The device according to claim 45, wherein said impurity is doped in a well layer.

48. A nitride semiconductor device comprising:

a first clad layer comprising an n-type nitride semiconductor;

an active layer of a quantum well structure provided on the first clad layer, said active layer comprising a nitride semiconductor containing indium and gallium and having at least one well layer having a thickness not greater than 70 angstroms, wherein said well layer is placed on an underlying layer in a state lattice-mismatched with the underlying layer and includes a plurality of indium-rich regions and indium-poor regions; and

a second clad layer which is provided on the active layer and comprises a nitride semiconductor doped with an acceptor impurity.

49. The device according to claim 48, wherein said active layer is doped with an impurity.

50. The device according to claim 49, wherein said impurity comprises silicon or germanium.

51. The device according to claim 49, wherein said

impurity is doped in said well layer.

52. A nitride semiconductor device including a first n-type layer which comprises an n-type, aluminum-containing nitride semiconductor or n-type gallium nitride; and a second n-type layer which comprises an n-type, aluminum-containing nitride semiconductor, wherein the device has a third n-type layer which comprises an n-type, indium-containing nitride semiconductor between the first n-type layer and the second n-type layer.